

Zero Retries issue 0064 2022-09-16

Zero Retries is a unique, quirky little highly independent, opinionated, self-published email newsletter about technological innovation in Amateur Radio, for a self-selecting niche audience, that's free (as in beer) to subscribe.

About Zero Retries

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Pseudosponsor - QSO Today Virtual Ham Expo

This issue of Zero Retries is pseudosponsored by the Fall 2023 [QSO Today Virtual Ham Expo](#) on Saturday 2022-09-17 and Sunday 2022-09-18.

Other than the unfortunate overlap with the 2022 ARRL and TAPR DCC the same weekend, [this event has much to recommend it](#). Although my attention that weekend will be on the DCC, I'll be paying the QTVHM fee just for the privilege of early access to the recordings for hours of Zero Retries Interesting presentations.

Request To Send

Countdown to [Digital Communications Conference 2022](#) - September 16-18, in Charlotte, North Carolina, USA:

~~10 09 08 07 06 05 04 03 02 01~~ week... *It's happening as you read this!*

Almost as long as I've been involved in Amateur Radio Packet Radio, “DCC weekend” is a big deal for me. I've attended perhaps a dozen DCCs in person, and my wife Tina KD7WSF and I helped organize DCC 1996 in Seattle, Washington. For a period after DCC 1996, Tina and I helped plan other DCCs in other cities. Even before DCC 1996, I would buy, and read the DCC Proceedings books (*on paper!*) just to marvel at the technological innovation in Amateur Radio. DCC 2022 is the 41st consecutive DCC - that... is... *amazing!*

The paper version of the DCC 1996 Proceedings is [now available on Lulu.com](#), and there is a [PDF version online](#). I look forward to DCC weekend every year. In the last decade, I've enjoyed watching the recorded

presentations, and in the last few years, live streaming. By the time you read this, the Friday presentations will be over, but there are presentations on Saturday and Sunday ([schedule](#)), so as you're reading this, [you haven't missed it](#).

I've said that of all the amazing progress that TAPR has brought into Amateur Radio, perhaps the most significant, long term impact will be that when the ARRL chose not to continue the DCC as an ARRL-produced event, TAPR picked up management of the DCC and continued it (brilliantly). **Thus, kudos to TAPR for continuing the DCC.**

As promised, my DCC 2022 paper - [A Brief Survey of Technological Innovation in Amateur Radio](#), is now online for public access.

de Steve N8GNJ

Digital Library of Amateur Radio & Communications Now Accepting Donations of Material

In December 2021, Amateur Radio Digital Communications provided an [\\$889,405 grant to Internet Archive](#) (IA) to create the **Digital Library of Amateur Radio & Communications (DLARC)**.

With this grant, the Internet Archive will build the Digital Library of Amateur Radio & Communications (DLARC): an online, open-access resource that preserves the vital resources — past, present, and future — that document the history of amateur radio and communications. The DLARC will provide a key open-access educational resource, free to use for researchers, students, and the general public. It will also serve as a permanent archive for the preservation of the history of ARDC, its members, and key individuals and organizations involved in the broader amateur radio movement. The DLARC will be both an education program building a unique and unparalleled collection of primary and secondary resources, but also an innovative technical project that will build a digital library that combines both digitized print materials and born-digital content and whose curatorial focus is driven by archiving and providing unified access to both personal and organizational archival records. Building the DLARC thus includes three distinct areas of work:

- A large-scale scanning program that digitizes relevant print materials such as journals, monographs, books, physical ephemera, and other physical records from both institutions and individuals;
- A large-scale digital archiving initiative that seeks to curate, archive, and provide specialized access to “born-digital” materials, such as digital photos and audio-video, as well as websites and web-published material;
- A personal archiving campaign to ensure the preservation and future access of notable individuals and stakeholders involved in the founding and activities of ARDC and the broader community.

I'm delighted to report that DLARC is now ready to accept donations of material. The Internet Archive representative for DLARC (Archivist) is [Kay Savetz K6KJN](#) (link is to his LinkedIn profile). K6KJN is based in the Portland, Oregon, USA area.

Here is K6KJN's description of his task with DLARC from his [QRZ profile](#):

I am [Internet Archive](#)'s program manager for special collections, and my job is to build the **Digital Library of Amateur Radio and Communications**, which will be a massive online library of ham radio.

Internet Archive is a non-profit online library, best known for [The Wayback Machine](#). The DLARC library is funded by a grant from the [Amateur Radio Digital Communications](#) foundation.

The library will be an online, open-access resource that preserves vital resources — past, present, and future — documenting the history of amateur radio and communications. The DLARC will provide a key open-access educational resource, free to use for researchers, students, and the general public. This innovative technical project will combine both digitized print materials and born-digital content.

[Same bullet points from the grant description.]

If you have material to contribute to the DLARC library or questions about the project, email me at [kay @ archive.org](mailto:kay@archive.org)

K6KJN is getting started reaching out to individuals and organizations about collections of Amateur Radio (and “communications”) material for possible donation to DLARC, including books, magazines, newsletters, technical material, software, and online resources. Material submitted to DLARC will be digitized and put online for public access. Because DLARC has funding from the ARDC grant to pay for digitization, material donated for DLARC is prioritized for digitization in the near term (weeks or months, not years). This was a specific concern of mine from past donations of material to Internet Archive that (to my knowledge) have yet to be digitized and made available online.

Note that DLARC is not limited to the US - DLARC is for Amateur Radio (and “communications”) worldwide.

The first step in arranging a donation is to contact K6KJN via email

kay@archive.org.

(K6KJN gave me permission to share his email address.)

From my correspondence with K6KJN about donating my collection, it’s helpful (but not required) if you assemble some info in advance:

- Lists of material you’d like to donate to DLARC
- Photos are great!
- Quantities of material

If you’re a creator of Amateur Radio content such as - presentations, videos, podcasts, photos, etc. and would specifically like your material to be incorporated into DLARC and publicly shared, contact K6KJN via email to make arrangements. In my case, I plan to provide IA / DLARC with some kind of blanket permission to use any of my material that DLARC discovers already online (such as articles, presentations, etc.) and material that I subsequently submit to them. The point of *my* writing about Amateur Radio has always been to “give back” to Amateur Radio for all the incredible fun and growth that I’ve enjoyed as an Amateur Radio Operator.

Donation of material to DLARC is especially useful to long-established clubs that have archive material - club newsletters, old Amateur Radio magazines, old technical material such as service manuals, etc.

To answer a question in advance, copyright will be respected at Internet Archive by using their Controlled Digital Lending process. An example (*my understanding of Controlled Digital Lending*) is that I will be donating a number of magazines and those magazines will be digitized. For *each* physical magazine that IA has in their inventory, a digitized version of *that* magazine (some complete with mailing sticker on the front cover) will be available for checkout via Controlled Digital Lending - an electronic version of the traditional role of a library lending out printed material for a limited period, then it is digitally returned to the library by the borrower.

Although it’s not a stated goal of Digital Library of Amateur Radio & Communications (DLARC), I hope to see an assemblage of unassailable evidence of technological innovation that first occurred in Amateur Radio. Amateur Radio had a fantastic history of technological innovation that paralleled commercial radio technology

throughout most of its more than a century of existence. But, in the last few decades of cellular phones, trivially easy international communications, etc., the relevance of Amateur Radio is increasingly called into question. With DLARC doing the “heavy lifting” of assembling a digital, curated, easy to browse archive of all manner of Amateur Radio material, it will hopefully be much, much easier for content creators like me, those working to update Amateur Radio regulations, academics, researchers, etc. to assemble a compelling case for Amateur Radio’s continuing relevance by demonstrating historical, and ongoing, technological innovation within Amateur Radio.

I’ve said before, and I continue to say, that in my opinion, ***DLARC is a big deal for Amateur Radio*** and I can’t wait to see my, and other’s Amateur Radio material made available online for sharing.

Disclaimer - I was one of the volunteer members of the ARDC Grants Advisory Committee that evaluated IA’s DLARC grant proposal. What I’ve written here in Zero Retries, and my future interactions with IA regarding donations of material to DLARC, are entirely independent of ARDC. I don’t speak for ARDC, and ARDC doesn’t speak for me.

The “Kind of” Amateur Radio Backstory of Apple’s “Emergency SOS Via Satellite” Feature

In **Zero Retries 0063**, Apple iPhone 14 Features Satellite Communication. I teased:

Update - Turns out, there’s a very cool postscript to this story that involves Amateur Radio technological innovation. But, there’s no *space* 🙄 for that story this week.

Part 1 - Diving a Bit Deeper on How SOS *Might* Work.

Disclaimer: I have no... absolutely zero... inside information about how SOS actually works in the iPhone and the satellite system. What little I think I know is from public sources, and the rest is pure supposition on my part, from my experience as an Amateur Radio Operator.

It’s significant when Apple specifically mentions limitations of a new feature in an iPhone - such as Emergency SOS Via Satellite (SOS). If you’re curious, check out Apple’s *Far out*. streaming event on 2022-09-07 beginning at 59:30:

Specific limitations mentioned include:

- Satellites are hundreds of miles in the sky, flying overhead at 15,000 miles per hour.
- Bandwidth so limited that even sending a text message is a technical challenge.
- No “bulky external antenna”.
- Unique satellite frequencies.
- Pointing [iPhone 14] directly at a satellite.
- Transmission time of 15 seconds to “a few minutes”.

Even with those limitations... *it works!* Beginning with iPhone 14, the required radio system (“custom components”), including (from other sources) a unique antenna will be incorporated into every subsequent iPhone.

To most technical folks, the idea of a “stock” iPhone (in appearance, anyway) being able to communicate with a Low Earth Orbit (LEO) satellite... is, seemingly, a laughable concept. Without at least a “bulky external antenna”, the required signal strength would be “too far down in the noise”.

But, to an Amateur Radio Operator with some experience in digital technology, that list of limitations might look familiar. Substitute the harsh conditions of HF for satellites, and it sounds really familiar - like [WSJT-X](#), specifically [WSPR](#):

- Works at low bandwidth.
- Trades significant processing in advance, including compression and forward error correction, for longer transmission time.
- Works with [minimal antennas and low power transmission](#).

So, Amateur Radio Operators can start to understand how Apple made SOS work, even with significant

limitations.

First, as Apple explains, to use SOS, you tap a few buttons to describe in advance what your situation is. That gets compiled into a standardized message (conceivably, a situation might be abbreviated to a message [that's actually transmitted] as terse as "13" for "Hiking, broke my leg, all alone". Combine that with a timestamp and Latitude / Longitude from the GPS, compress all of that, and a very small amount of data is queued for transmission.

Then you optimize the Signal to Noise Ratio by "aiming the antenna". The app helps you out with this, somehow knowing in advance (receiving beacons from the satellites?) what the orbital path of the satellites are overhead, and where to aim the top of the phone.

Finally, give it a few seconds to transmit the whole message. WSPR transmits for approximately 110 seconds. SOS transmits for a minimum of 15 seconds, to "a few minutes".

Thus, transmitting a reliable message from an iPhone to a LEO satellite is definitely challenging, but doable.

Part 2 - Amateur Radio's Connection to SOS

At DCC 2002, a very bright young Amateur Radio Operator presented a novel concept for a new kind of radio where most of the functionality of the radio was done on host computers as software, rather than building all the filtering, modulation, demodulation, etc. functions with hardware components. The idea was to create a modular set of radio building blocks with the bare minimum in hardware, and the rest of the "radio" done in software. He asked "*someone, please build this*".

A few years later, I heard that the young Amateur Radio Operator had founded a startup company to manufacture his "building block radio" because no one else had done so. He had been involved in creating a comprehensive suite of open source software for "software radio", and he saw the potential of a new type of radio that could take *full advantage* of this new paradigm in radio technology - *Software Defined Radio*. Founding a company on that vision was audacious, even by startup standards - selling "building block radios" that didn't even work unless the *user created the software* to make them work, even with the help of the suite of open source software.

I next heard of this young Amateur Radio Operator a few years later when his company had become quite successful. It turns out that "building block radios, that didn't even work unless the user created the software" was just what researchers, academics, manufacturers building prototypes... nearly anyone involved in development of new radio technology, realized that these products were exactly what they needed. This new type of radio allowed cost effective development of new radio technology and systems. Test things, and when they didn't work, update the software and try again.

Fast forward a few more years and the young Amateur Radio Operator's company was such a success that it was sold to a much larger company that had financial resources to take the building block radios to a new level of capability. The young Amateur Radio Operator worked for the much larger company for a few years.

Then... the day that Apple debuted the Emergency SOS Via Satellite feature, this showed up in my Twitter feed:

The tweet that this was a response to reads:

So, there's this misconception about cell phones I hear occasionally - that they "talk to satellites (your iPhone is not a satphone, I promise).

I replied:

Matt Ettus... at Apple. With your background and the vast resources there, the mind reels at the possibilities. 😎 If you were involved in Emergency SOS - congrats!

He replied:

Thank you for your kind words. I am indeed one of the founding members of the team responsible for SOS via Satellite.

The very bright young Amateur Radio Operator is Matt Ettus N2MJI, founder of [Ettus Research](#), now a division of [National Instruments](#). The primary product that he founded his company to build is still called the Universal Software Radio Peripheral (USRP), and the open source software suite for “software radio” is now known as [GNU Radio](#).

Apologies for any mangling of the respective roles and timelines of Ettus Research and GNU Radio. See the [GNU Radio Wikipedia page](#) for some history.

N2MJI tells part of this story in a presentation at [DCC 2014 - USRP / RFNoC](#) (Radio Frequency Network on Chip), which is now a [product](#) of Ettus Research.

Thus, at least in *my* mind, there’s a clear line of progress from Amateur Radio’s history of technological innovation, to N2MJI presenting his audacious idea at an *Amateur Radio* Digital Communications Conference, to N2MJI developing his idea along the way in part with Amateur Radio, to the development Apple’s Emergency SOS Via Satellite feature.

Because of N2MJI’s Amateur Radio background and the work he did with USRP and GNU Radio, N2MJI knew that Apple’s Emergency SOS Via Satellite feature *was feasible*, when others might have dismissed the idea as impractical. The rest was hard work, innovation, and Apple’s capability to enable people like N2MJI to create new technology at scale. Scale, as in Apple will sell more iPhone 14s capable of satellite communication *in the first week it’s on sale*, than all the satellite phones sold since the beginning of the satellite era.

Disclaimer - I’m a fan of Apple’s products and especially their approach to developing new technology. I’m not an “Apple Fanboy”, uncritically cheering everything Apple does. I’m a (very, very minor) Apple stockholder.

Zero Retries Sponsorships

The Zero Retries sponsorship model is *evolving*, but it’s initially inspired by the [Daring Fireball blog’s sponsorship model](#) (other than this sponsorship cost). Some initial points:

Sponsorship of Zero Retries is only available to “Zero Retries Interesting” companies, organizations, individuals, and projects. Ideally, a Zero Retries sponsor is involved in Amateur Radio, but that’s not an absolute requirement. If an individual or company would like to sponsor Zero Retries, but prefer to remain anonymous, that’s acceptable, but the “Zero Retries Interesting” criteria still apply.

- Sponsorships are limited to a *brief* mention in Zero Retries - a few sentences at most (but prominently displayed). Example - “WhizzyPacket is proud to sponsor this week’s Zero Retries”. More targeted sponsorship messages are acceptable, such as “WhizzyPacket is looking for a few good engineers - click here”.
- A sponsorship is for *one* weekly issue of Zero Retries and is exclusive - one sponsor per week. Sequential sponsorships are available - as much as three months of sponsorship is acceptable. Longer than three months, let’s discuss it.
- Lastly, although it kind of defeats the overt purpose of sponsorship, if a *Zero Retries Interesting company, organization, individual, or project cannot afford to pay for a sponsorship*, but wants / needs to “get the word out”, Zero Retries can probably work something out. In fact, if there are gaps in sponsorships, I’ll probably create some gratis sponsorship messages.

If you are interested in sponsoring Zero Retries, please reach out - it’s early days. More importantly, if you know of a company, organization, project, or individual that you think could / would / should sponsor Zero

Retries, *please point out Zero Retries to that entity.*

Zero Retries Poll - Starlink Article

Zero Retries 0063 poll: Should I have kept the article about Starlink (moved to the SuperPacket blog) in Zero Retries 0063? 46 votes were cast.

- Yes - I'm interested in Starlink. - 83%
- No - Starlink isn't Amateur Radio. - 17%

46 votes is more than I've had previously for a Zero Retries poll - noted! It probably helps poll participation to put it earlier in the issue.

Join the *Fun* on Amateur Radio

If you're not yet licensed as an Amateur Radio Operator, and would like to join the fun by *literally having a license to experiment with radio technology*, check out

Join the Fun on Amateur Radio for some pointers.

Closing the Channel

In its mission to highlight technological innovation in Amateur Radio, promote Amateur Radio to techies as a literal license to experiment with wireless technology, and make Amateur Radio more relevant to society in the 2020s and beyond, Zero Retries is published via email and web, and is available to anyone at no cost. Zero Retries is proud *not to participate* in the Amateur Radio Publishing Industrial Complex, which hides Amateur Radio content behind paywalls.

My ongoing *Thanks* to:

- Tina Stroh KD7WSF for, well, *everything!*
- Pseudostaffer [Dan Romanchik KB6NU](#) for continuing to spot, and write about “Zero Retries Interesting” items on his blog that I don’t spot on my own.
- [Amateur Radio Weekly](#) and [Southgate Amateur Radio News](#) consistently surface “Zero Retries Interesting” stories.
- The [Substack email publishing platform](#) makes Zero Retries possible. I recommend it for publishing newsletters.

If you're reading this issue on the web and you'd like to see Zero Retries in your email Inbox every Friday afternoon, just click:

Subscribe now

If you're a fellow smart person that uses **RSS**, there *is* an **RSS feed for Zero Retries**.

Zero Retries is on Twitter @ZeroRetries - just click:

[Zero Retries on Twitter](#)

Please tell your friends and co-conspirators about Zero Retries - just click:

Share Zero Retries

Offering **feedback or comments** for Zero Retries is equally easy; yes, you guessed it... just click:

Leave a comment

Email issues of Zero Retries are “instrumented” by [Substack](#) to gather basic statistics about opens, clicking links, etc. I don’t use such information in any way other than seeing that most subscribers actually do read Zero Retries.

More bits from Steve Stroh N8GNJ:

- [SuperPacket blog](#) - *Discussing new generations of Amateur Radio Data Communications - beyond Packet Radio (a precursor to Zero Retries)*
- [N8GNJ blog](#) - *Amateur Radio Station N8GNJ and the mad science experiments at N8GNJ Labs - Bellingham, Washington, USA*

Thanks for reading!

Steve Stroh N8GNJ / WRPS598 (He / Him / His)

These bits were handcrafted in beautiful Bellingham, Washington, USA

2022-09-16

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